

REMARKS/ARGUMENTS

Reconsideration of the application is requested.

Claims 1, 5, 6, 8, and 9-11 are now in the application.

Independent claim 9 and dependent claims 10 and 11 have been added. Claims 2, 3, 4, and 7 were previously canceled.

New independent claim 9 contains the features of independent claim 1 with the additional feature that the distance between the center portion and a plane defined by a circle along the outer portion of the surface (for supporting the semiconductor wafer) "being substantially 500 $\mu$ m" (as disclosed on page 9, line 5 of the instant specification). New claim 10 depends from claim 9 and recites that the distance is "500 $\mu$ m" (as disclosed on page 7, line 22 of the instant specification).

New claim 11 depends from claim 1 and recites that the wafer is in always in contact with the surface at its perimeter edge only for thermal contact between the wafer and the surface. Support for this may be found at page 4, line 15 and page 9, lines 1-2 of the instant specification.

Applicant has noted an obvious unintentional error in line 8 on page 2 of the instant specification wherein "10 inch

wafers" should properly read as --8 inch wafers--. It is apparent that the diameter of 200 mm in the metric system corresponds to a diameter of 8 inches (not 10 inches) in the English system. The instant specification has been corrected accordingly.

In the second item on page 2 of the above-identified final Office Action, claims 1 and 8 have been rejected as being unpatentable over Yamada et al. (U.S. Patent 4,986,215) (hereinafter "Yamada") under 35 U.S.C. § 103(a). The Examiner refers to Fig. 8c of Yamada and states that the "recited dimensions are obvious for the reasons stated in the office action mailed 6/18/03."

The claims have been amended by adding new claims 9-11 to further define the present invention over the cited prior art. The previously presented claims are considered patentable over the cited prior art for the reasons discussed below.

Before discussing the prior art in detail, it is believed that a brief review of the invention as claimed, would be helpful. Claim 1 calls for, *inter alia*, a susceptor for supporting a semiconductor wafer having a diameter of at least 300mm and a perimeter edge, the susceptor having:

a surface for supporting the semiconductor wafer, the surface having a concave shaped surface area, the surface area being configured to cause the semiconductor wafer to contact the surface area at the perimeter edge only, the surface having a center portion and an outer portion surrounding the center portion, defining a distance between the center portion and a plane defined by a circle along the outer portion, the circle having a diameter of substantially 300mm and the distance being greater than 500 $\mu$ m. (emphasis added)

Yamada discloses a susceptor 1 for supporting a substrate 7. The susceptor has a circular edge or ridge 6, which defines an inner space 4 having a concave bottom. The substrate is supported in line contact with the ridge 6. The ridge 6 supports the substrate at an area inwardly displaced from the perimeter of the substrate. See Fig 3A. The reference discloses that the substrate may have a diameter of 150mm and that the distance (depth "a") between the center portion of the concave surface and the bottom surface of substrate 7 is in the range of 25 $\mu$ m to 150 $\mu$ m. These dimensions of Yamada are important to obtain the advantages disclosed in Yamada's specification and therefore are not "an obvious matter of design choice..." as alleged by the Examiner and in

applicant's view would require more than "routine optimization" to change them to meet the claim limitations. The Examiner has reached the foregoing conclusion merely because he is unable to find prior art that shows the instant claimed invention. Yamada does not disclose dimensions for the susceptor per se or the distance between the center portion of the concave susceptor surface and the outer portion of the concave surface as recited in claim 1 of the instant application. The claimed dimensions enable the present invention to achieve the advantages disclosed in the instant specification.

Nor does Yamada show a distance of substantially 500 $\mu$ m or 500 $\mu$ m as recited in new claims 10 and 11. Moreover, Yamada does not disclose or teach that the wafer always touches or thermally contacts the chuck surface at its perimeter only as recited in dependent claim 11 of the instant application.

Fig. 8C does not disclose 300 mm wafers and does not teach or suggest that the distance between the wafer and the bottom part of the concave shape is in the range of or substantially 500  $\mu$ m. The present invention is directed to providing optimal dimensions for a 300 mm wafer for a hot wafer susceptor, which is a trade-off between good thermal coupling

between the wafer and the chuck, and avoids jumping of the wafer when placed onto the chuck. This is not even recognized or suggested by the cited prior art. The inventions of the prior art references were made at a time frame when 200 mm wafers were used rather than 300 mm wafers so that the effects of 300 mm wafers could not have been considered as they are taken into account in the present claimed invention.

The Examiner does not distinguish between the perimeter edge of the wafer of the present invention which contacts the concave surface area of the susceptor and the area of the perimeter edge of the wafer 7 of Yamada, which contacts the ridge 6 of the susceptor 1. Claim 1 emphasizes and recites this difference between the present invention and Yamada. Claim 1 recites that the surface of the wafer susceptor has a concave shaped surface area which is configured to cause the semiconductor wafer to contact the perimeter edge only. Thus, the concave shaped surface area per se of the susceptor surface only contacts the perimeter edge of the wafer according to the present invention.

New dependent claim 11 recites that "said semiconductor wafer is always in contact with said surface area at the perimeter edge only for thermal contact between said wafer and said surface area" which is not disclosed or suggested in Yamada.

To the contrary, in Yamada the ridge 6 contacts the wafer, not a concave shaped surface area of the wafer. The ridge itself does not have a concave shape and therefore, the ridge must contact the wafer within a specific range disclosed in Yamada as from 0.6R to 0.9R (see col. 4, lines 3-4). Thus, it is apparent that one skilled in the art would not necessarily construct the susceptor of Yamada with a ridge that contacts the wafer only at its perimeter edge, namely at a radius of 1.0. According to the present claimed invention, the wafer is contacted at its perimeter or boundary edge, that is 1.0R. In view of the foregoing it is submitted that it would not be obvious to modify Yamada to arrive at the claimed invention.

The Examiner argues that modification of Yamada to arrive at the claimed invention involves "design choice" and "routine experimentation and optimization to choose [these] particular dimensions." Applicant respectfully disagrees with the Examiner's statements. The examples disclosed in Yamada are based on a 150mm wafer. The depth "a" is in the range of from 25 $\mu$ m to 150 $\mu$ m. There is no suggestion or teaching that such depth can be changed or how it would be changed for a 300mm wafer as recited in the claims. There is no disclosure as to how one would scale up the dimensions for a 300mm wafer. For

example, if the device was scaled up proportionately then the scale-up factor would be a factor of two (2 x 150mm). Thus, the depth "a" for a 300mm wafer would be in the range of from 50 $\mu$ m to 300 $\mu$ m. However, according to the present invention the depth between the wafer and the center portion of the concave shaped susceptor is "greater than 500 $\mu$ m" as recited in claim 1, "substantially 500 $\mu$ m" as recited in claim 9, and "500 $\mu$ m" as recited in claim 10 of the instant application. None of these features is shown or suggested in Yamada.

Therefore, it is apparent that Yamada does not disclose the specific dimensional limitations of claims 1, 9, or 11, or the structural contact configuration of claim 11, nor would it be obvious for one skilled in the art to arrive at such dimensions through "routine optimization," as the Examiner incorrectly alleges. Yamada teaches away from providing the specific dimensions recited in the claims as discussed above. Contrary to the Examiner's statements, the claimed dimensions are important features of the present invention to achieve the desired objectives and advantages described in the instant specification. For example, it is important that the claimed wafer have a dimension of at least 300mm, not 150mm as disclosed in Yamada, in order to support only the perimeter (or boundary) edge of the wafer. This avoids movement of the

wafer, particularly when the susceptor is hot. Contrary to the Examiner's assertions, applicant submits that the claimed dimensions and spacing are important to obtaining the advantages of the present invention and are beyond "routine optimization", and therefore should be afforded patentable weight.

Clearly, Yamada does not disclose a susceptor for supporting a "semiconductor wafer having a diameter of at least 300mm and a perimeter edge" in which the susceptor has "a surface for supporting the semiconductor wafer, said surface having a concave shaped surface area, said surface area being configured to cause the semiconductor wafer to contact said surface at the perimeter edge only, said surface having a center portion and an outer portion surrounding said center portion, defining a distance between said center portion and a plane defined by a circle along said outer portion, said circle having a diameter of substantially 300mm and said distance being greater than 500 $\mu$ m", as recited in claim 1 of the instant application.

Further, Yamada does not show or the structural contact configuration of claim 11, namely, "said semiconductor wafer is always in contact with said surface area at the perimeter



edge only for thermal contact between said wafer and said surface area."

In the third item on page 2 of the above-identified Office Action, claim 5 has been rejected as being unpatentable over Yamada as applied in the rejection of claims 1 and 8, and further in view of Martin et al. (U.S. Patent 4,579,080) (hereinafter "Martin") under 35 U.S.C. § 103(a). The Examiner states that Martin is applied as stated in the prior Office Action mailed June 18, 2003.

The arguments presented above relative to Yamada are equally applicable in the rejection of claim 5, which depends from claim 1.

While Martin discloses that a susceptor 52 may be formed of graphite or another material such as molybdenum, Martin does not overcome the basic deficiencies of the primary Yamada reference as discussed above. Therefore, claim 5, which depends from claim 1, is believed patentable for the same reasons as discussed relative to claim 1.

In the fourth item on page 2 of the above-identified Office Action, claim 6 has been rejected as being unpatentable over

Yamada as applied in the rejection of claims 1 and 8, and further in view of Wolf, Vol. 1, under 35 U.S.C. § 103(a).

Claim 6 depends from claim 1 and is believed patentable for the same reasons as discussed above with respect to claim 1.

Wolf does not make up for the deficiencies of Yamada.

Moreover, applicant respectfully disagrees with the Examiner's dismissal and disregard of specific claimed features such as the claimed dimensions and spacing recited in claim 1 of the instant application. The prior art does not disclose or suggest providing specific dimensions and spacing of a semiconductor wafer and a susceptor for supporting the semiconductor wafer, namely, a "semiconductor wafer having a diameter of at least 300mm" and "a distance being defined between said center portion and a plane defined by a circle along said outer portion, said circle having a diameter of substantially 300mm and said distance being greater than 500 $\mu$ m", as recited in the claim 1. More than routine skill and optimization and design choice are required to provide the dimensional relationships of the claimed invention in order to achieve the desired advantages and benefits of the instant invention. The specific dimensions of the distance between

the wafer and the center portion of the concave surface and that the surface of the susceptor is close enough to the backside of the wafer, which allows efficient heating to occur, are important features that enable the present claimed invention to obtain its desired advantages. The prior art does not teach or suggest such specific features. One skilled in the art could conceivably select any number of dimensions from an infinite multiplicity of possibilities and still would not necessarily select those recited in the claims of the instant application without the benefit of hindsight. Applying the Examiner's reasoning is tantamount to saying that that no patentable weight should be given to claimed dimensions of claimed specific structural elements. Such is not the case and the Examiner's statements are not considered a proper basis for rejecting these claimed features. New claims 9 and 10 also contain dimensional limitations.

It is accordingly believed to be clear that none of the references, whether taken alone or in any combination, either show or suggest the features of claim 1 or 9. Claims 1 and 9 are, therefore, believed to be patentable over the art. The dependent claims are believed to be patentable as well because they all are ultimately dependent on claim 1 or 9.

It is accordingly believed to be clear that none of the references, whether taken alone or in any combination, either show or suggest the features of independent claim 1 or 9. Claims 1 and 9 are, therefore, believed to be patentable over the art. The dependent claims are believed to be patentable as well because they all are ultimately dependent on claim 1 or 9.

In view of the foregoing, reconsideration and allowance of claims 1, 5, 6, and 8 together with new claims 9-10 are solicited.

In the event the Examiner should still find any of the claims to be unpatentable, counsel would appreciate receiving a telephone call so that, if possible, patentable language can be worked out.

Petition for extension is herewith made. The extension fee for response within a period of one month pursuant to Section 1.136(a) in the amount of \$110.00 in accordance with Section 1.17 is enclosed herewith.

Please charge any other fees that might be due with respect to Sections 1.16 and 1.17 to the Deposit Account of Lerner and Greenberg, P.A., No. 12-1099.

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Respectfully submitted,



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